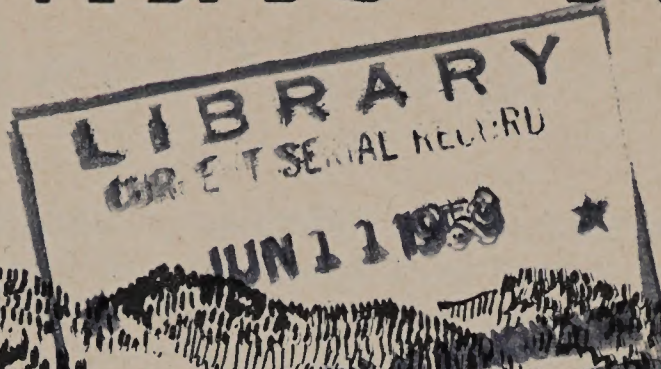


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FRASER FIR as a CHRISTMAS TREE

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U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE • EXTENSION SERVICE

Advantages of Growing Fraser Fir

1. High ornamental and Christmas tree quality.
2. Easily established in plantations and fast growing.
3. Requires little cultural work and is fairly pest free.
4. Low harvest cost and little snow problem in southern highlands.
5. Late-season cutting and fresher trees because of nearness to markets.
6. Large potential markets in East and South for—
 - Room-size Christmas trees
 - Balled ornamentals for landscape planting
 - Balled table-top Christmas trees
 - Boughs for Christmas decorations for civic use, department stores, churches, and homes.
7. Short haul and low transportation cost to markets.
8. Provides an off-season operation and supplemental income.
9. A cash tree-crop for farmers and others who own low-producing open lands.

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Fraser Fir as a Christmas Tree

Fraser fir grows naturally in the Southern Appalachian highlands and is highly desired as a Christmas tree. It has thick, lush, green foliage, is beautifully shaped with a spirelike top (fig. 1), is fragrant with the balsam odor of the north woods, and has needles that are retained unusually well even in the warmth of living rooms. Fraser fir is becoming recognized by growers and dealers as a superior tree with high potentialities in the Christmas tree industry.

It was first discovered on the high peaks of western North Carolina by John Fraser (1750–1811), Scotch nurseryman and plant explorer, who recognized its beauty and introduced it into Great Britain. People sometimes use other names for the tree—eastern fir, Fraser balsam fir, she-balsam, southern balsam fir, and southern fir.

Where It Grows

Fraser fir is native to the Appalachian Mountains at elevations of 4,000 to 6,684 feet, in western North Carolina, eastern Tennessee, and southwest Virginia. The most numerous stands of this species in western North Carolina are located on Mount Mitchell in Yancey County, on Grandfather Mountain in Avery, Caldwell, and Watauga Counties, on the Black Mountains in Yancey and Buncombe Counties, on the Balsam Mountains in Jackson and Haywood Counties, and on Roan Mountain in Mitchell County. Other stands occur in the Great Smoky Mountain National Park along the Tennessee-North

Carolina State line in the area of Mount Guyot, Mount Chapman, Mount Kephart, Clingmans Dome, and Mount Le Conte in Tennessee.

At 6,000 feet and higher Fraser fir grows in pure stands. At 5,000 to 6,000 feet it grows in mixtures with red spruce. Where it occurs at 4,000 to 5,000 feet it is usually associated with hardwoods such as yellow birch, mountain-ash, mountain maple, and pin cherry.



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FIGURE 1.—Fraser fir has the shape, density, color, and balsam fragrance desired by the Christmas tree trade. This tree was grown in North Carolina.

In the early 1800's the Southern Appalachians could boast of 1,500,000 acres of spruce-fir forests covering their higher elevations. These beautiful forest stands have been drastically reduced and now less than 100,000 acres remain. Unfortunately the early residents did not appreciate the value of the spruce-fir forests and their place in the economy; besides, there was little knowledge as to how they could be managed for continuous production. It is understandable that heavy cutting, wasteful logging methods, and ensuing fires greatly reduced the spruce-fir woods. This forest situation is rapidly changing as foresters acquire more information through research work, field plantings, and management experience.

A North Carolina mountain resident who helped cut off the spruce and fir about 25 years ago "figured that would be the last time he would ever make a nickel working timber." He said he never dreamed that some day he would be cutting Christmas trees in the same woods. The people of the highlands and the many visitors are beginning to see and appreciate the importance of rebuilding the forest and cropping it wisely (fig. 2).

Size, Form, and Growth

Although Fraser fir is known as a medium-size tree, it attains a height of 40 to 70 feet and a diameter of 1 to 2 feet. Some trees have been found in the Mount Mitchell area with a height of 100 feet and a diameter of 30 inches. Branches are regularly in whorls on young trees, and crowns have pyramidal shape and compactness. Leaves are flat, $\frac{1}{2}$ to 1 inch long, dark green and lustrous above, with a silvery-white cast beneath, which gives a two-tone color effect. Fraser fir is



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FIGURE 2.—A healthy plantation of Fraser fir in Avery County, N. C. These trees, 6 years old, will soon be ready for the market. This is a profitable tree crop.

regarded by some people as one of the most beautiful Christmas trees. It grows fast on favorable sites, is very attractive when young, and holds its needles for a long time after cutting.

On good sites in the Appalachian highlands, Fraser fir should reach 6-foot height in 6 to 8 years after planting. The same growth would probably require 10 years or more in favorable areas in the Northeastern States.

Nursery Practice

Because of mounting public interest, Fraser fir seedlings are being grown for Christmas tree stock in two State nurseries in North Carolina. One is the Holmes State Nursery near Hendersonville at an elevation of about 2,200 feet (fig. 3). The other is the new Catawba Nursery at Morganton, about 1,200 feet elevation, where Fraser fir was seeded in the spring of 1957.

According to B. H. Corpening of the North Carolina Department of Conservation and Development, the oldest stock at the Holmes nursery in 1957 was 2 years old and probably would be large enough for lifting at the end of the third growing season. Generally it will take 3 years in the seedling bed for growth to lifting size (fig. 4). At that time seedlings should have a good root system and be 4 to 5 inches in height with roots equally long.

These seedlings are being grown for local use and, if demand justifies, there may be considerable expansion in the growing of this species. Fraser fir is not too difficult to grow under nursery conditions.

The growing of rooted cuttings is another method of producing planting stock (fig. 5). A grower in West Virginia, probably the first to use this method for Christmas tree production, has successfully rooted fall cuttings in a hotbed with about 80 percent survival.



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FIGURE 3.—A bed of Fraser fir in the Holmes State Nursery. A nurseryman and an extension forester inspect the growth of these promising young trees, which will be ready for field planting in another year.



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FIGURE 4.—Vigorous seedlings that have grown 8 inches tall in 3 years. The average height will be about 5 inches with roots 5 inches long.

Seed Collecting

Concerning seed collecting, Mr. Corpening reported: "We gather our own seed and this past year gathered about 100 bushels of the cones. The cost of gathering Fraser fir seed in the cone in this area is about \$5 to \$15 per bushel, depending on quantity of cones on individual trees. This results in a cost of about \$3.50 to \$10 per pound of cleaned seed. Compared with other species the gathering of the Fraser fir and red spruce cones is by far the most expensive, due to inaccessibility of the trees and the difficulty of climbing and pulling cones in the tops (fig. 6).

"We have a local crew experienced in the gathering of cones. As far as is known, no other seed or nursery grown seedlings of Fraser fir are being produced in this area."

Some seed is borne annually but good crops occur at 3- to 4-year intervals. There are 44,000 to 69,000 cleaned seeds per pound and germination is reported to average about 50 percent.



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FIGURE 5.—A tray of small Fraser fir cuttings which rooted well in one year. They were grown in a hotbed where moisture and temperature conditions could be controlled. They will be transplanted and should be ready for field planting after the third growing season.

Planting Recommendations

In the Southern Appalachian Mountains Fraser fir should be planted at an elevation of 2,000 feet or higher. At the minimum elevation, planting sites should be carefully selected. The soils best suited for this species are acid (about pH 3.5 to 5.5) and have some organic matter and a moderate water-holding capacity. This tree apparently grows best under moist conditions. At higher elevations with heavy rainfall it grows in shallow soils with bedrock within 2 feet of the surface. On the tops of the higher mountains it establishes itself and competes successfully with grass and shrubs. At lower elevations it is found growing naturally on northern exposures.

Most of the plantings in the southern highland area will be at 2,000 to 3,000 feet, in comparatively cool and moist locations. Fraser fir may not grow satisfactorily below this elevation in the Southern Appalachians, especially on hot dry sites with southerly exposures.

Fraser fir should not be planted on old pastures or in any heavy sod without site preparation in the form of plowing, possibly followed by a good disking if needed. This will remove root competition and make more moisture available to the young trees. Fraser fir is somewhat shallow rooted; therefore, cultivating it after planting is not practical, because this would be likely to damage the roots. Old pasture sods in the mountain sections tend to rob young planted trees of moisture to a critical de-



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FIGURE 6.—The cones of Fraser fir stand upright on the twigs and are usually bunched at the top of the tree or at the ends of the larger limbs, which makes them difficult to harvest.

gree. Since cultivation is not desirable, it is very important to prepare the site before planting.

As Fraser fir requires acid soil, planting on old pastures that have been limed in the last 5 years should be avoided unless the soil is determined to be acid by testing it. Your county agent can assist in making tests or tell you where soil samples can be tested. This would also reveal the need, if any, for fertilizers to bring about a more favorable condition for best growth.

The recommended spacing for planting Fraser fir for Christmas trees in North Carolina is 4 by 4 feet, or about 2,700 trees per acre. This spacing will allow thinning the stand at about 5 years after planting for table trees before the main harvest of room trees. Many Christmas tree growers in other States use a spacing of 5 by 5 feet, which takes 1,740 trees per acre. This spacing permits the growing

of a 6- to 8-foot tree without serious crowding.

Most plantation care will be confined to keeping livestock out of Fraser fir plantations, protecting them from fire, cutting out or poisoning competing shrubs and trees, and shearing of leaders (fig. 7) and possibly some branches in the faster growing stands to maintain good Christmas tree form.

Stump Culture

It is possible to propagate Fraser fir by stump culture. When a Christmas tree is cut, the bottom whorl of limbs is left below the stump cut. These will turn upward, and by cutting all but the most vigorous limb another tree is grown from the stump. These turn-ups require careful shearing or shaping to develop into good trees.



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FIGURE 7.—Shearing the leaders in fast-growing plantations of Fraser fir is necessary to develop good tree form. A county agent in Avery County, N. C., demonstrates this operation.

Some growers have been successful in getting sprout growth from dormant buds which break through the bark at the top of the stump. These sprouts should be thinned so that the dominant one is left to produce another tree.

Natural Fir Stand Producing Christmas Trees

The first commercial cutting of Fraser fir for Christmas trees was made by the U. S. Forest Service on Roan Mountain, which is on the North Carolina-Tennessee line. This mountain, famous for its floral display of purple rhododendron, attracts thousands annually. Interspersed with the rhododendron and crowning the mountaintop is a stand of evergreen trees of about 800 acres, consisting of 90 percent Fraser fir and 10 percent red spruce. This vigorous 20- to 25-year-old forest, which came in after the pulpwood cutting operations, is part of the Toecane Ranger District of the Pisgah National Forest. By developing a market for native fir and spruce, the Forest Service in 1950 sold 1,000 trees and a few hundred pounds of boughs. The district ranger (at Burnsville, N. C.) reported that this business has grown each year. In 1955, 22,000 trees and thousands of pounds of boughs were sold from cuttings on his district, and the demand exceeded the supply.

The harvesting of trees is confined to compartments, which are carefully laid out. Every tree in these units that should be removed is marked. A prospectus describing the contents of the units is sent prospective buyers who may want to cut and market the trees (fig. 8). On a designated day the units are auctioned off to the highest bidders.

Another operation is the timber

stand improvement work which removes competing hardwoods through cutting, girdling, and poisoning but leaves game-food and den trees for wildlife. This encourages the reproduction and growth of the fir stand and improves the form and quality of trees.

This system of management for Christmas tree production in natural forest stands is being developed to assure continuous crops, preserve the recreational use of the area, and enhance the beauty and scenic splendor of the Roan Mountain Gardens. The Roan Mountain area is also serving as a demonstration, showing interested landowners how young forests can be managed to produce Christmas tree crops which pay off yearly. Each Christmas tree from Roan Mountain is labeled with an attractive red tag which informs the user that its cutting was not destructive but gave needed room for neighboring trees to grow faster and better.

Plantation Trees Grown in West Virginia

The largest private planting of Fraser fir in West Virginia for Christmas trees is on Cheat Mountain near Valley Head. The owner of this 101½-acre plantation made his first planting in 1949 and since then has planned to plant 5,000 Fraser fir seedlings each year. Even after some losses due to poor-quality seedlings, there remain 25 to 30 thousand living trees, 1 foot to 8 feet in height, the largest being 8 years old (fig. 9).

Ordinarily, Fraser fir has grown vigorously on Cheat Mountain at an elevation of about 3,900 feet and with an average annual rainfall of more than 55 inches. The soil, a heavy-textured red clay derived



FIGURE 8.—A forest ranger, a producer, and a dealer inspecting a natural stand of Fraser fir Christmas trees. (Courtesy North Carolina Department of Conservation and Development.)

from shale, holds moisture well. Height growth of the larger trees ranged from 12 to 30 inches during 1957. Some experimental shearing has been done. The removal of the terminal buds on laterals is being tried as a means of stimulating compactness. Recent plantings have been spaced 5 feet apart and 5 feet between rows. So far there has been no trouble with insects or diseases.

In commenting on current operations, the owner stated that the first

sale of these premium trees was in 1956, when about 500 trees in sizes from 4 to 8 feet were ready for the market. He sells wholesale at the farm with the purchaser doing the cutting under his supervision. All trees to be cut are tagged according to size. The owner believes he is offering the people of West Virginia one of the best Christmas trees grown.

A grower of trees and shrubs at Princeton, W. Va., has worked with 30 or more species including



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FIGURE 9.—An 8-year-old plantation of Fraser fir on Cheat Mountain in West Virginia ready for the market. As growth is rapid, shearing at the proper time would have improved the density of the foliage.

pine, spruce, fir, and others for Christmas trees, timber production, and landscape planting. He has a series of hotbeds and cold-

frames for nursery work. Fraser fir planting stock is being produced by rooting cuttings, growing seedlings in seedbeds, and by lining out wild or collected stock in the nursery prior to planting in the field. Fraser fir and Scotch pine are the principal trees being planted for Christmas tree production. Fraser fir plantings in a pasture are doing well (fig. 10), with an average growth of about 8 inches the third year after planting.

New York Experience

A Christmas tree plantation, "Spruce Top," established by the late Joshua Cope, near Ithaca, N. Y., has perhaps 1,000 Fraser firs, about 10 years old. James D. Pond pruned them the first time in June 1955 and harvested about 40 that year, mostly 4-foot trees and one 7-foot tree, to thin out the stand planted 3 by 3 feet. Commenting on Fraser fir, Mr. Pond said, "The trees resemble balsam fir, but foliage is more shiny, the limbs are stiffer, and the tree has a sturdy appearance. The needles appear



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FIGURE 10.—A well-established West Virginia planting of 2-1 Fraser fir stock made in sod. Grass competition is kept down by mowing.

two-ranked on the twigs, and there are superficial needles on the stems. As the trees were rather open we pruned them, mostly on the terminal shoot, to thicken the foliage. I sold the trees to a local dealer who paid the same price as for Douglas-fir.

"As far as site quality goes, these firs are growing on stony Lordstown soil at the top of a ridge with an easterly exposure, but the trees are about one-half shaded by the remnant of the original plantation of Norway spruce planted in 1922 and ranging up to 45 feet in height but with lower 8 feet of branches pruned off. This may explain the rather slow height growth, as the major portion of firs are 4 to 5 feet high. We hope to cut about 200 this next season."

Other Plantings in the Northeast

Several plantings have been made in Pennsylvania. Two at about 2,000-foot elevation are doing well. There it apparently will take 10 or more years to make a 7- to 8-foot tree.

Fraser fir has been grown successfully as far north as Orono, Maine, where several fine specimens about 20 years old and 16 feet tall are growing on the campus of the University of Maine near the president's home. Fraser fir makes a satisfactory outdoor, living Christmas tree (fig. 11) in areas where growing conditions are favorable.

Value as Christmas Trees

A Christmas tree dealer in a large city has said, "Fraser fir is the most beautiful Christmas tree that grows. We would handle no other species, and it brings premium prices."



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FIGURE 11.—This beautiful Fraser fir, growing in a nursery, with its fresh spring growth just coming out, could grace a front lawn as a living Christmas tree.

A decorative engineer gave as his opinion: "For decorative purposes no other foliage can compare with the boughs of Fraser fir."

A producer of Christmas trees in the North Carolina mountains for 25 years, who handled 6,000 trees and 40 tons of boughs in 1956, said, "The growing and harvesting of Fraser fir Christmas trees and boughs is a pleasant and profitable business."

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